

“DUST DETECTIVE”

Static Air Sampling Enclosure

For Microdust *pro*

User Manual
HB3341-02

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WARNINGS!

The Microdust *pro* and associated Static Sampling Unit is non- intrinsically safe and **MUST NOT** be used within a hazardous area.

DISPOSAL OF BATTERIES: Batteries and battery packs must never be disposed of by placing in a fire or incinerator, nor must they be punctured, crushed or otherwise mutilated or opened up in any way. Disposal must be in accordance to local environmental legislation.

Ensure the Apex and Microdust *pro* are held firmly by the Velcro straps provided, otherwise damage to the instruments could occur.

All optical measurement systems are sensitive to the presence of moisture droplets both in the air and bonded to particulate matter. To prevent possible measurement errors, the system should not be used in conditions of high humidity, rainfall or condensation.

Dust Detective - Static Air Sampling Enclosure Unit

Introduction

With increased awareness of environmental pollution from fine particulate in the workplace and increasing enforcement of COSHH and environmental legislation, the demand for more area and perimeter monitoring on a short to medium term basis is on the increase. This need for real-time particulate information is a requirement in general industry, when looking at Total Suspended Particulate (TSP), and at inhalable and respirable dust levels as a health issue.

CASELLA CEL have introduced the “**Dust Detective**” Static Air Sampling (SAS) enclosure for exactly this application. This accessory provides a simple solution to short to medium term fixed area monitoring with the Microdust *pro* and Apex sampling pumps and is designed specifically for use in indoor applications, but some short term outdoor perimeter samples can be undertaken with the unit.

When monitoring perimeter dust conditions, the system should not be used under conditions of high humidity, condensation, rain or fog. The APM 950 is a mains powered device better suited for this application. (Contact sales department for further details).

The IP65 case is designed to accommodate a standard Microdust *pro* as well as an Apex or Apex Lite air sampling pump which provides a precise inlet flow rate.

The Dust Detective SAS Unit has been designed as an accessory for existing Microdust *pro* users as well as for potential customers looking for a complete system when supplied complete as the **Dust Detective**.

(In this format , the enclosure also doubles as the equipment carry case for the Microdust *Pro*.)

The complete system would require the purchase of the static air sampling enclosure (Part number 176170D), plus the following additional items:-

Microdust Pro,
Apex Standard or Pro Sampling Pump with charger or Apex Lite Sampling pump
Apex starter kit or suitable Flow Meter Kit
Pre weighed GFA filters. (See ordering Information section 7)

The key component to this accessory is the sampling inlet which utilises PUF size-selective filter techniques. Size-selective filters were originally developed for operation in the Conical Inhalable Sampler (CIS) as detailed within the Health and Safety Executive publication MDHS 14/3. The foam filter specifications and dimensions determine the desired aerosol size selection characteristics and eliminate particle sizes greater than PM₁₀, PM_{2.5} or Respirable (4 µm) as appropriate. The larger particles become trapped and collect within the foam matrix, whilst all particles below these “cut-off points” pass through the PUF filters and enter the measurement chamber, where the real time mass concentration is established.

After passing through the Microdust *pro*, particulate matter is deposited on a 25 or 37mm filter which may be used for gravimetric or chemical analysis.

Remember however, although the Dust Detective system has been designed to monitor particulate fraction concentrations in a variety of environments, it does have some operating limitations. The instrument is not designed to operate continuously out of doors for long periods over 19 hours.

Due to the light scattering principle used within the instrument, any moisture which individual particles attract at periods of high humidity or temperatures approaching “dewpoint” will be “seen” by the instrument as larger particles. This biases results towards greater concentrations. Also, during these periods, any air being drawn through the instrument which is high in humidity may condense on the optics and distort the light beam, producing spurious results.

Any application requiring this type of monitoring regime, will need a particulate monitor with internal heater, to drive off any water vapour within the incoming air stream, thus eliminating erroneous readings. The Casella Ambient Particulate Monitor (APM950) is considered the best tool for this job and can run continuously and unattended for months at a time. Please contact CASELLA CEL or your distributor for more information.

System Overview

The internal configuration of the Dust Detective is shown in Figure 1. The system incorporates an Apex sampling pump to draw the sample air through the inlet pipe at a user selected flow rate. PUF filters are designed to operate at a flow rate of 3.5 L/min. The inlet head is designed to prevent the ingress of insects and other large foreign objects. A **dust cap** is provided to seal the inlet port on the case lid whenever the inlet tube is removed for transit purposes.

Size selection of the sample stream is performed by passing the sample through a PUF foam filter appropriate to the chosen sampling strategy, (PM₁₀, PM_{2.5} or Respirable). PUF filter adaptors are described in Figures 3 and 4. A nozzle on the mounting block is a push fit into the inlet fitting on the case lid.

Power Supply

The Microdust *Pro* is powered via either internal rechargeable NiMh cells (2.1Ah) or via AA sized dry cells. (This allows the unit to run for typically 19 hours.)

The Apex Lite pumps are powered via 4 x AA Alkaline cells. Other Apex (Standard and *pro*) pumps use rechargeable NiMH cells.(1.7Ah) and must be fully charged before use.

Run Times

Apex Standard > 20 hours, Apex I.S >12 hours, Apex Lite > 24hours (@ 3.5L/min via GFA filters). Microdust *Pro* with NiMH batteries typically 19 hours.

Using the Dust Detective SAS Unit

Installation

Cutouts are provided in the foam for the Microdust *Pro* and Apex sampling units. Ensure both units are fully charged up or have new AA cells if required before insertion.

Note: Ensure the Apex and Microdust *pro* are held firmly by the Velcro straps provided, otherwise damage to the instruments could occur.

Connect the Apex pump to the sampling spigot (X).

Connect the Microdust probe into the Adaptor Block and correctly align such that the locating spigot on the PUF Filter Holder locks into the Probe Measuring Chamber. When locked correctly into position, the complete assembly is prevented from rotating or moving laterally on the probe. (see figure 4). The body of the probe will be located into the retaining clip.

PUF Filter Adaptor

For size-selective monitoring applications, it is necessary to load the appropriate foam filter(s) into the inlet adaptor. If TSP (Total Suspended Particulate) monitoring is required, then no foams should be fitted within the inlet assembly.

The type of foam filter loaded into the adapter determines the size of particulate matter being monitored by the Microdust *pro* and collected on the filter. Although the PUF foam inserts have been designed as size-selective filters to capture particles larger than a specified mean aerodynamic size, it is also possible to weigh the PUF inserts before and after measurement to establish both the total suspended particulate (TSP) value and the desired size fraction.

Storage of PUF Filters

The PUF filters should be kept in a clean and preferably air-conditioned environment.

Inserting / Removing PUF Filters

The PUF filters should be carefully inserted or removed from their respective cassettes using clean tweezers and plastic gloves. Avoid subjecting the filters to physical damage, creasing or folding.

Filters should be loaded into the relevant housing as shown in Figure 3,4.

Collection Filter Cassette

A Filter Cassette is provided to accommodate a 37 or 25mm filter. The desired filter type (typically of the GFA type) should be conditioned and pre-weighed (if required) before being loaded into the cassette. Always handle filters with care to prevent contamination or physical damage.

Powering up and using the system

Checking the Instrument's Zero

Check the zero calibration for the Microdust Pro before every use. This can be achieved either as described in the Microdust *Pro* handbook, utilising the purge air bellows connected to the probe purge points. Alternatively to calibrate in situ, remove the inlet cowl, and connect the in-line air filter to the inlet tube, start the Apex pump. With clean air in the probe, the display should be zeroed.

Checking Probe Span

The span of the Microdust *pro* should be checked in accordance with the relevant User Manual. The span can also be checked by inserting the calibration filter and checking the reading. If required, adjust the span control according to the User Manual.

Sampling Pump

The Dust Detective enclosure is designed to use the Apex range of personal samplers. This allows the user to take a standard personal sampling pump, charge the unit up and install inside the enclosure. The pumps are designed to provide a flow rate capability of up to 4.0 L/min whilst using a 37 mm GFA filter head (at up to 25 cm H₂O pressure drop). Automatic flow control circuitry is used to maintain a stable sample flow rate over varying pressure drop conditions.

To switch the pump on, press the enter key on the pump. When running a real time flow meter symbol will appear on the display and a green flashing light will be visible at the top of the pump. To switch the pump off, press and hold the enter key and the pump will countdown to off. PUF filters are designed to operate at a flow rate of 3.5 L/min.

Check the performance and calibrate the Apex sampling pump according to the manual and adjust the flow rate to 3.5 L/min.

If the pump is unable to maintain the selected flow rate due to excessive pressure drop or an inlet blockage, the red LED will begin to flash and the warning tone will bleep rapidly.

Starting a Sample Run

1. Remove the protective dust cap and fit the sample inlet tube/head to the case (see fig 2).
2. Insert the PUF filter foam(s) and in line sample filter (if required) (see figure 3,4).
3. Switch the Microdust *pro* and Apex pump on. Confirm zero using the in-line filter connected to the sample inlet.
4. Check that the Apex flow rate is set to 3.5L/min.
5. Locate unit in required location. Start pump and Microdust data logger according to their respective user manuals.

SERVICE

It is recommended that the unit is serviced annually, more frequently when used in high dust areas.

CASELLA CEL's in house service department offers a comprehensive range of repair and calibration services, designed to effect a fast and efficient back-up for all our products. The service department is operated under the scope of our BSI registration for products manufactured by us. We will however, undertake the repair of other manufacturers' equipment.

For further information please contact CASELLA CEL's Service Department at our Bedford premises. We will be happy to provide quotations for individual repairs or provide annual maintenance under contract.

We recommend factory service by technicians trained and equipped to repair your instrumentation. Should you wish factory repair assistance, send your equipment in a package equivalent to the original packaging.

Insure to full value and ship pre-paid. Include a letter giving full details with your packing list.

Send to:

CASELLA CEL (Service Department)
Regent House
Wolseley Road
Kempston
Bedford
MK42 7JY

If purchased outside the United Kingdom, please return to your distributor.

TECHNICAL INFORMATION

Enclosure Specification

Operating temperature range:	+5 to +40°C in the absence of condensation
Storage temperature range:	-25 to +55°C
Humidity range:	30 to 90% RH provided there is no condensation
Storage humidity range:	0 to 90% RH in the absence of condensation
Size:	410 x 330 x 175 mm
Weight:	7 kg without probe

Apex Pump Specification

Flow range	0.8 to 4.0 L/min
Flow control accuracy	±5% for selected flow
Operating temperature	0 to +45°C
Dimensions	135 x 75 x 43 mm

Additional Apex Features

- ✧ Elapsed time display
- ✧ Real Flow Rate indication
- ✧ Automatic flow fault indicator and shutdown
- ✧ Low battery warning indicator and bleeper
- ✧ Low battery shut down.

PUF / Filter Spares

Foam filter - PM _{2.5} (pk of 10)	P118204
Foam filter - PM ₁₀ (pk of 10)	P118206
Foam filter - Respirable (pk of 10)	P118208
Pre weighed filters (25mm GFA)	P117000
Pre weighed filters (37mm GFA)	P117001

Ordering Information

Dust Detective Unit Complete	176171A
Static Air Sampling Enclosure	176170D
Microdust Pro Kit (0-2500mg/m ³)	176000A
Apex Standard Rechargeable Pump	182000B
Apex Charger	182052B
Apex Lite (Dry cell version)	182170B
Apex starter kit	P104104

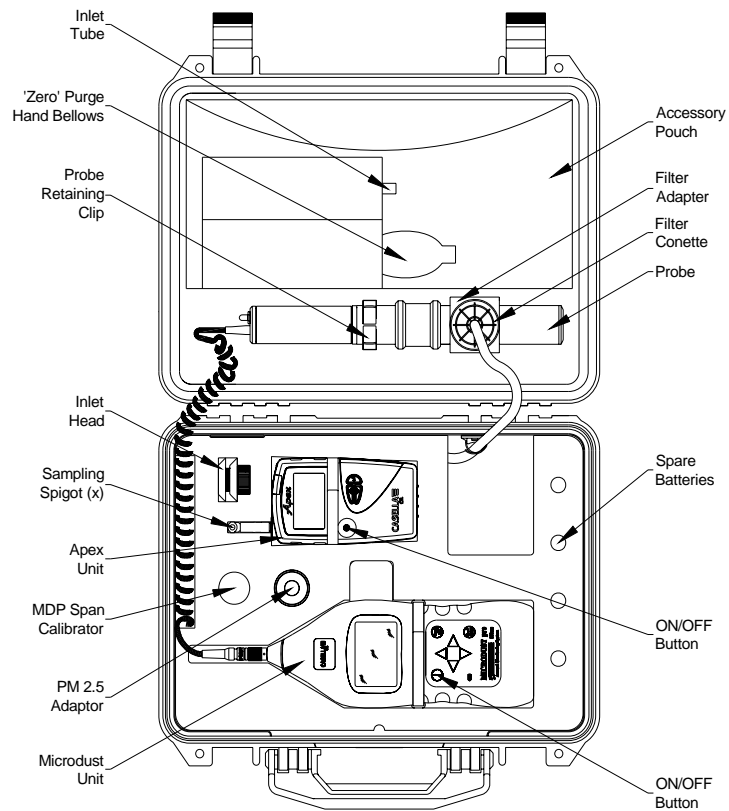


Figure 1 - Components and controls for dust detective.

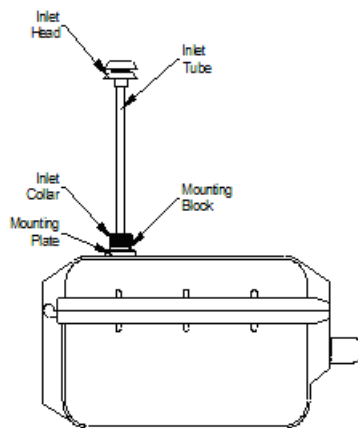


Figure 2 - External view of Dust Detective.

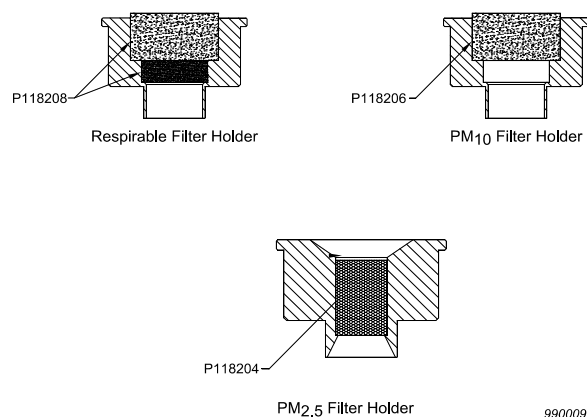


Figure 3 - PUF Filter configurations.

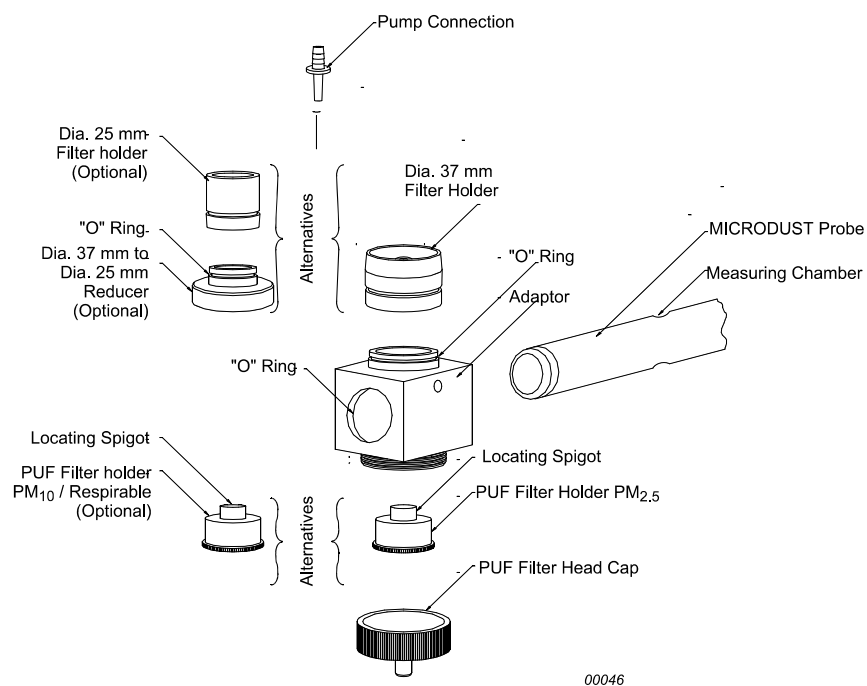


Figure 4 - Adaptor and Filter configurations.

ALTERATION WITOUT NOTICE
The contents of this manual are subject to change without notice